Avian leucosis and fowl paralysis

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IN all poultry raising areas throughout the world leucosis accounts for a greater loss of birds than any other disease.

In broilers, only coccidiosis is more important as a cause of mortality, whilst in adult flocks leucosis is by far the most common cause of losses.

A typical measure of the extent of losses caused by leucosis, is seen in the reports of progeny trials in the U.K. from 1950 to 1953. In these trials losses due to leucosis from hatching to 18 months of age ranged from 27.6 per cent. to 53 per cent.—that is, from one quarter to one half of all the birds were killed by leucosis in a year and a half.

However, despite this heavy death rate, careful consideration of the facts about this disease will provide poultry men with practical methods for reducing leucosis losses to a low level.

DESCRIPTION

It is usual nowadays to consider avian leucosis as a group of closely related diseases characterised by a tumorous (uncontrolled) proliferation of cells of the blood-forming organs. Just as there are several varieties of cells in the blood, so are there several kinds of leucotic tumours produced by the unbridled increase of these cells.

Pathologists have sub-divided leucosis into six or seven separate types, but for practical purposes we may reduce this number to three, and consider leucosis as being—

1) Lymphoid,
2) Myeloid, and
3) Erythroid.
Enlarged liver from a bird which died of visceral leucosis. Note the greyish areas and projecting tumours.

The tumours in the lymphoid group are far more common than the others and include the well known "big liver disease" in which lymphoid cells are diffusely increased throughout the organ giving rise to a creamy-pink to bluish-grey colour of the liver, and a similar appearance of the spleen and kidney, which are also commonly involved. The lymphoid tumours may also be discrete or nodular in appearance, occurring not only in the liver but also in the spleen, ovary, kidney, intestine and, sometimes, the lungs, heart and pancreas.

The myeloid types are also either discrete or diffuse. The discrete myeloid tumours may be missed as they are present as crumbly chalky-white masses on the surfaces of the sternum (breast bone) ribs and pelvis, and are usually covered by the other organs. Diffuse myeloid leucosis gives the enlarged liver, spleen, or ovary a granular reddish or pink appearance.

The third type (erythroid) is due to numerical increase in the cells that give rise to the red blood cells, and produces soft bright-red enlarged livers and spleens.

**CAUSE**

All of these leucotic tumours are caused by a virus (or several very closely related viruses).

There has been a controversy for many years as to whether the virus(es) is transmitted through the hatching egg or disseminated to the birds after hatching from
contaminated environments. Evidence has been submitted to support both contentions but it is entirely likely that egg transmission is much less important than originally suspected and that the virus is picked up, for the most part, from infected environments.

RESISTANCE

Chickens are at their most susceptible during the first two weeks of life and then gradually become more resistant. By the time they are 10 to 16 weeks old they have attained considerable resistance.

It has been possible to develop lines of poultry which have a high degree of natural immunity to leucosis, and conversely, lines which are extremely susceptible. This work has focussed attention on the possibility of eliminating leucosis by breeding. However, even so-called resistant strains of chickens are not completely refractory and the cost and difficulties in developing these poultry lines are so great that only a highly organised industry could contemplate approaching the problem in this way.

TRANSMISSION

Although egg transmission appears relatively unimportant there is no doubt that it does occur and helps perpetuate leucosis.

It has been shown that young hens of susceptible lines are more apt to shed virus into their eggs than hens of resistant lines or older hens. Therefore, the importance of egg transmission of leucosis depends on the age of the breeding flock and its constitution in terms of susceptible or resistant birds.

The age resistance of leucosis is, in part, the result of antibody production. Antibodies are carried through the egg and remain in the chicken for two or three weeks after hatching.

Much of the protection against future onset of leucosis in a flock is therefore determined by the age and the state of resistance of the breeding flock, in terms of both virus shedding and antibody carry-over.

When leucosis virus is egg transmitted, it is often excreted by the newly hatched chicken in the intestinal droppings and in the saliva, so that both the litter and the feed and water rapidly become contaminated, spreading the infection throughout the incubator or brooder to the rest of the hatch at its most susceptible age.

Apart from minor transmission directly through the egg, leucosis virus is therefore spread chiefly by the excretions of infected birds through either feed or water, or by air-borne particles.

In regard to air-borne transmission, experiments have shown that susceptible chickens brooded 40 feet from a source of infection, such as an adult flock, may have four times as much leucosis as those brooded 100 feet away from such a source. This is conclusive evidence that the desiccated excretions of carrier birds are able to infect chickens during the brooding, or immediate post-brooding periods.

Infection of susceptible birds may also be indirect, such as by attendants carrying virus laden particles on their feet, clothing, and so on.

FOWL PARALYSIS

The virus responsible for this complex of poultry diseases is different from the virus(es) causing the leucotic symptoms discussed above.

Current research strongly suggests that fowl paralysis is not egg transmitted, but is carried in the same ways as leucosis.

Fowl paralysis is overwhelmingly a disease of young birds with a peak incidence at about four months. In recent years it has tended to appear earlier in life and birds as young as three weeks are now sometimes affected.

In this disease, peripheral nerves are involved. Whilst it is commonly thought that the typical form is that manifested by paralysis of the leg and wing muscles with out-stretched dragging legs or drooping wings (these are, of course, quite characteristic), it should not be forgotten that any nerve may be affected. Thus, nerves of the neck, crop, respiratory system, alimentary canal and tail may be diseased with the production of such gross changes as twisted neck, enlarged crops and proventriculi, and drooping tails.

Included in the fowl paralysis complex of diseases are the ocular form causing
the well known "pearly eye," and visceral forms which are difficult to distinguish from true avian leucosis. Any of the organs, particularly the ovary, may have these fowl paralysis "tumours" which are pinkish or greyish-white and quite firm.

It has been found that flocks affected with other diseases are more likely eventually to develop fowl paralysis than otherwise healthy flocks.

**TREATMENT AND CONTROL**

There is no treatment for either avian leucosis or fowl paralysis.

Affected birds invariably die, either from the direct effects of a space-occupying lesion, or from disturbances of physiological functions.

The management of avian leucosis and fowl paralysis is therefore a matter of applying the basic knowledge of the diseases with a view to controlling the spread of the viruses and to taking advantage of the immunity or resistance factors inherent in poultry flocks.

The control of those diseases may be summarised as follows:—

1. Breeding flocks should, if possible, be deliberately built up from resistant lines of fowls.

   Since susceptible hens succumb early in laying life and resistant hens are much slower in showing clinical signs of disease, resistant flocks can be developed by selecting breeders from the second or later laying seasons.

   Besides being more resistant such birds shed much less virus and transmit measurable quantities of antibodies, both tending to protect young chickens from infection during the first three or four months.

2. Chickens should be brooded in thoroughly decontaminated quarters in complete isolation from adult flocks (at least 100 feet from such flocks and upwind from them).

   Furthermore, all indirect avenues of infection, such as contaminated feed or water, or human carriers, should be rigorously excluded.

   The day's management routine must be arranged so that brooding chickens, or those younger than 10 to 16 weeks, are attended to first. Ideally, separate attendants, and feed and water supplies, for the young susceptible birds and the older carrier flocks, are indicated.

3. Control other poultry infections such as coccidiosis and chronic respiratory disease, and avoid any stress producing environmental factor, such as overcrowding.
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